

Features

N-Ch:

- $V_{DS}(V) = 30V$
- $R_{DS(ON)} < 29m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 46m\Omega$ ($V_{GS} = 4.5V$)

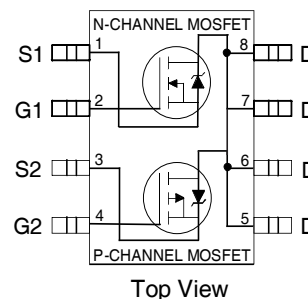
P-Ch:

- $V_{DS}(V) = -30V$
- $R_{DS(ON)} < 58m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 98m\Omega$ ($V_{GS} = -4.5V$)

- Generation V Technology
- Ultra Low On-Resistance
- Complimentary Half Bridge
- Surface Mount
- Fully Avalanche Rated
- Lead-Free

Description

The SOP-8 has been modified through a customized eadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques



Absolute Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)

		Symbol	Maximum		Units
			N-Channel	P-Channel	
Drain-Source Voltage		V _{DS}	30	-30	V
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current⑤	T _A = 25°C	I _D	7.3	-5.3	A
	T _A = 70°C		5.9	-4.2	
Pulsed Drain Current		I _{DM}	30	-30	
Continuous Source Current (Diode Conduction)		I _S	2.5	-2.5	
Maximum Power Dissipation ⑤	T _A = 25°C	P _D	2.5		W
	T _A = 70°C		1.6		
Single Pulse Avalanche Energy		E _{AS}	82	140	mJ
Avalanche Current		I _{AR}	4.0	-2.8	A
Repetitive Avalanche Energy		E _{AR}	0.20		mJ
Peak Diode Recovery dv/dt ②		dv/dt	3.8	-2.2	V/ ns
Junction and Storage Temperature Range		T _J T _{STG}	-55 to + 150 °C		

Thermal Resistance Ratings

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient ^④	$R_{\theta JA}$	50	$^\circ C/W$

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter		Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	N-Ch	30			V	$V_{GS} = 0V, I_D = 250\mu A$
		P-Ch	-30				$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	N-Ch		0.022		V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
		P-Ch		0.022			Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	N-Ch		23	29	$m\Omega$	$V_{GS} = 10V, I_D = 5.8A$ ④
				32	46		$V_{GS} = 4.5V, I_D = 4.7A$ ④
		P-Ch		42	58		$V_{GS} = -10V, I_D = -4.9A$ ④
				76	98		$V_{GS} = -4.5V, I_D = -3.6A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	N-Ch	1.0			V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		P-Ch	-1.0				$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	N-Ch	—	14	—	S	$V_{DS} = 15V, I_D = 5.8A$ ④
		P-Ch	—	7.7	—		$V_{DS} = -15V, I_D = -4.9A$ ④
I_{DSS}	Drain-to-Source Leakage Current	N-Ch	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0V$
		P-Ch	—	—	-1.0		$V_{DS} = -24V, V_{GS} = 0V$
		N-Ch	—	—	25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$
		P-Ch	—	—	-25		$V_{DS} = -24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	N-P	—	—	± 100	nA	$V_{GS} = \pm 20V$
Q_g	Total Gate Charge	N-Ch	—	22	33		N-Channel
		P-Ch	—	23	34		$I_D = 5.8A, V_{DS} = 15V, V_{GS} = 10V$ ④
Q_{gs}	Gate-to-Source Charge					nC	P-Channel
Q_{gd}	Gate-to-Drain ("Miller") Charge						$I_D = -4.9A, V_{DS} = -15V, V_{GS} = -10V$
$t_{d(on)}$	Turn-On Delay Time	N-Ch	—	8.1	12		N-Channel
		P-Ch	—	13	19		$V_{DD} = 15V, I_D = 1.0A, R_G = 6.0\Omega, R_D = 15\Omega$ ④
t_r	Rise Time	N-Ch	—	8.9	13		
		P-Ch	—	13	20		
$t_{d(off)}$	Turn-Off Delay Time	N-Ch	—	26	39		P-Channel
		P-Ch	—	34	51		$V_{DD} = -15V, I_D = -1.0A, R_G = 6.0\Omega, R_D = 15\Omega$
t_f	Fall Time	N-Ch	—	17	26		
		P-Ch	—	32	48		
C_{iss}	Input Capacitance	N-Ch	—	650	—		N-Channel
		P-Ch	—	710	—		$V_{GS} = 0V, V_{DS} = 25V, f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	N-Ch	—	320	—	pF	P-Channel
		P-Ch	—	380	—		$V_{GS} = 0V, V_{DS} = -25V, f = 1.0\text{MHz}$
C_{rss}	Reverse Transfer Capacitance	N-Ch	—	130	—		
		P-Ch	—	180	—		

Source-Drain Ratings and Characteristics

	Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	N-Ch	—	—	2.5	A	
		P-Ch	—	—	-2.5		
I_{SM}	Pulsed Source Current (Body Diode) ①	N-Ch	—	—	30		
		P-Ch	—	—	-30		
V_{SD}	Diode Forward Voltage	N-Ch	—	0.78	1.0	V	$T_J = 25^\circ\text{C}, I_S = 1.7A, V_{GS} = 0V$ ③
		P-Ch	—	-0.78	-1.0		$T_J = 25^\circ\text{C}, I_S = -1.7A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	N-Ch	—	45	68	ns	N-Channel
		P-Ch	—	44	66		$T_J = 25^\circ\text{C}, I_F = 1.7A, di/dt = 100A/\mu s$ ④
Q_{rr}	Reverse Recovery Charge	N-Ch	—	58	87	nC	P-Channel
		P-Ch	—	42	63		$T_J = 25^\circ\text{C}, I_F = -1.7A, di/dt = 100A/\mu s$ ④

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 22)
- ② N-Channel $I_{SD} \leq 4.0A, di/dt \leq 74A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
P-Channel $I_{SD} \leq -2.8A, di/dt \leq 150A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ③ N-Channel Starting $T_J = 25^\circ\text{C}, L = 10\text{mH}, R_G = 25\Omega, I_{AS} = 4.0A$. (See Figure 12)
P-Channel Starting $T_J = 25^\circ\text{C}, L = 35\text{mH}, R_G = 25\Omega, I_{AS} = -2.8A$.
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ⑤ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.

N-Channel

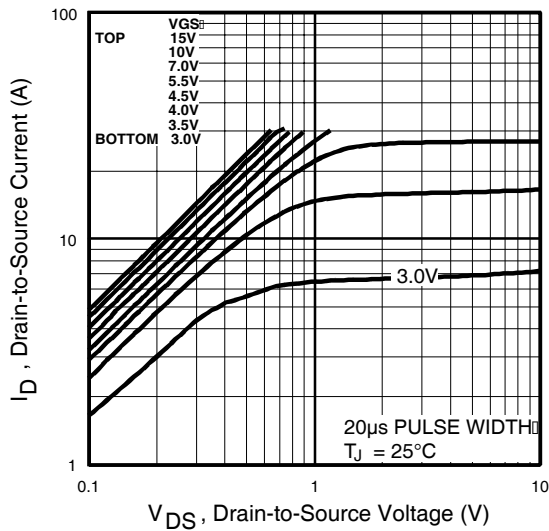


Fig 1. Typical Output Characteristics

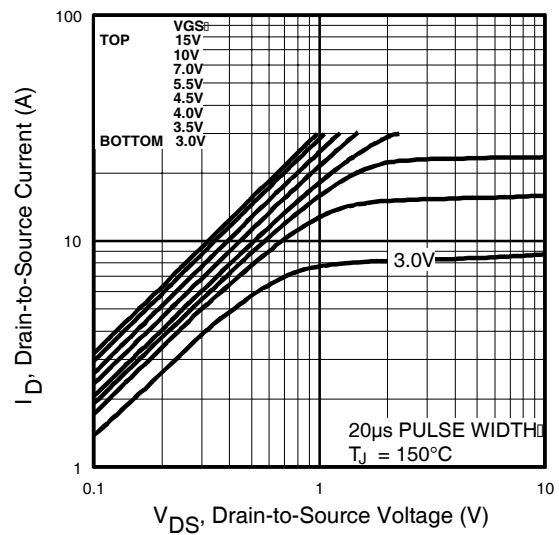


Fig 2. Typical Output Characteristics

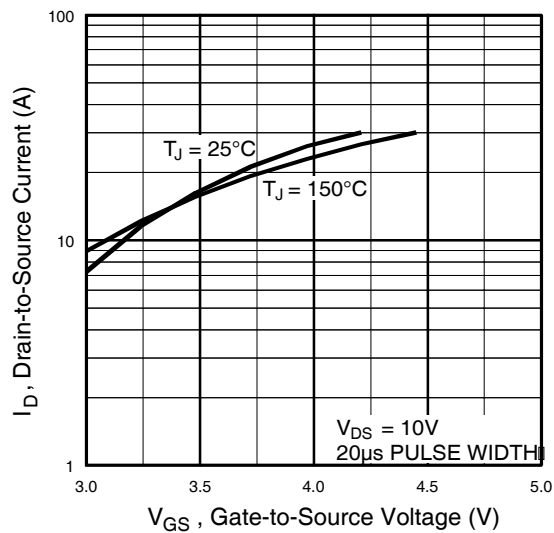


Fig 3. Typical Transfer Characteristics

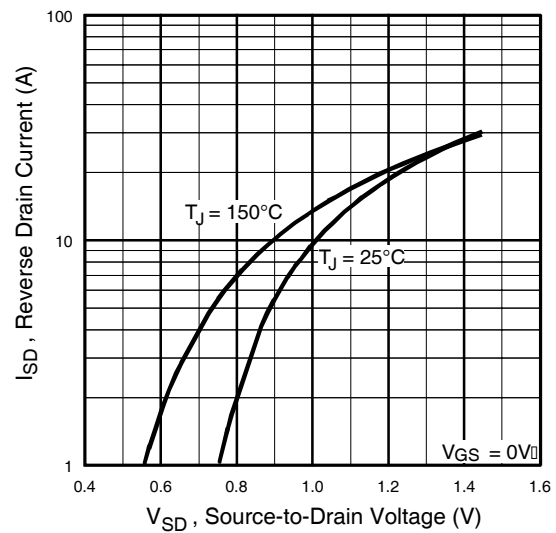


Fig 4. Typical Source-Drain Diode Forward Voltage

N-Channel

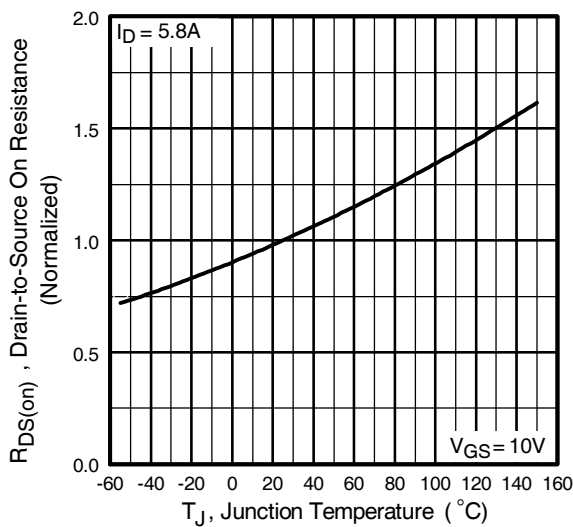


Fig 5. Normalized On-Resistance Vs. Temperature

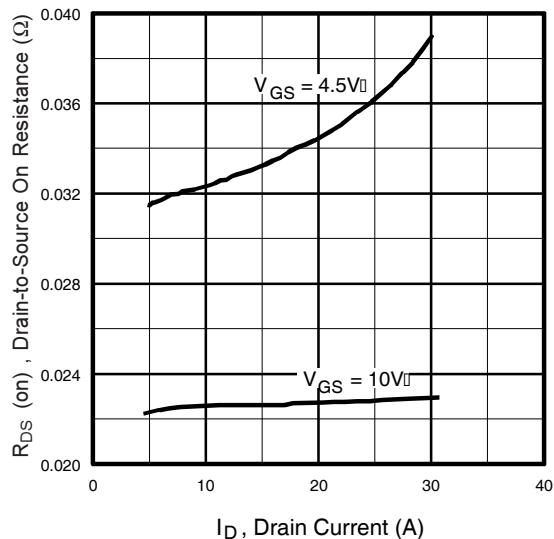


Fig 6. Typical On-Resistance Vs. Drain Current

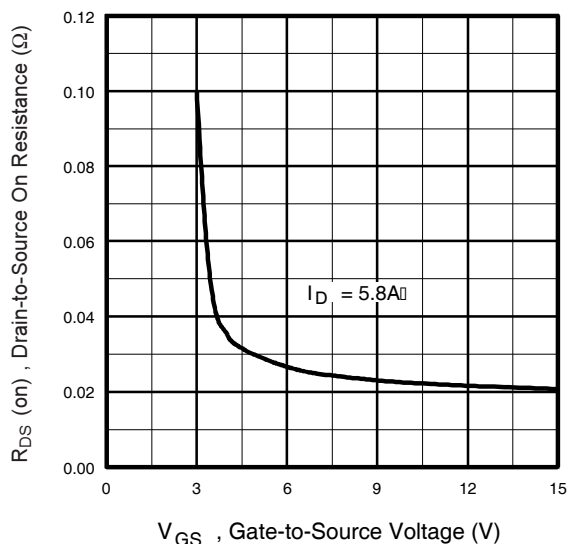


Fig 7. Typical On-Resistance Vs. Gate Voltage

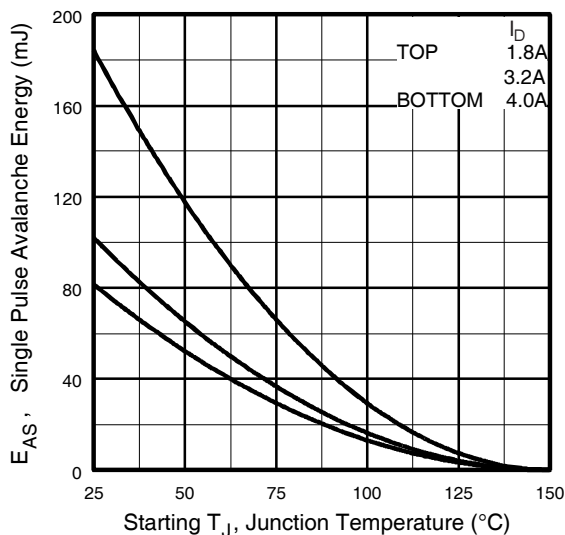


Fig 8. Maximum Avalanche Energy Vs. Drain Current

N-Channel

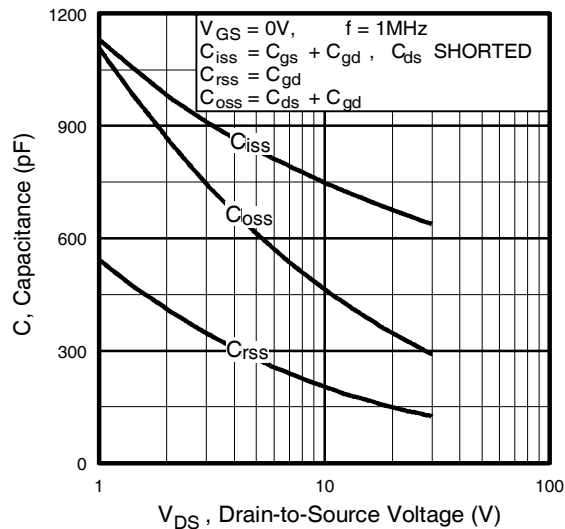


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

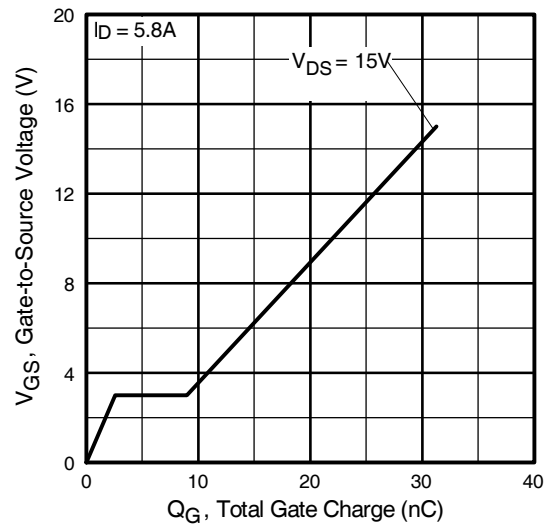


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

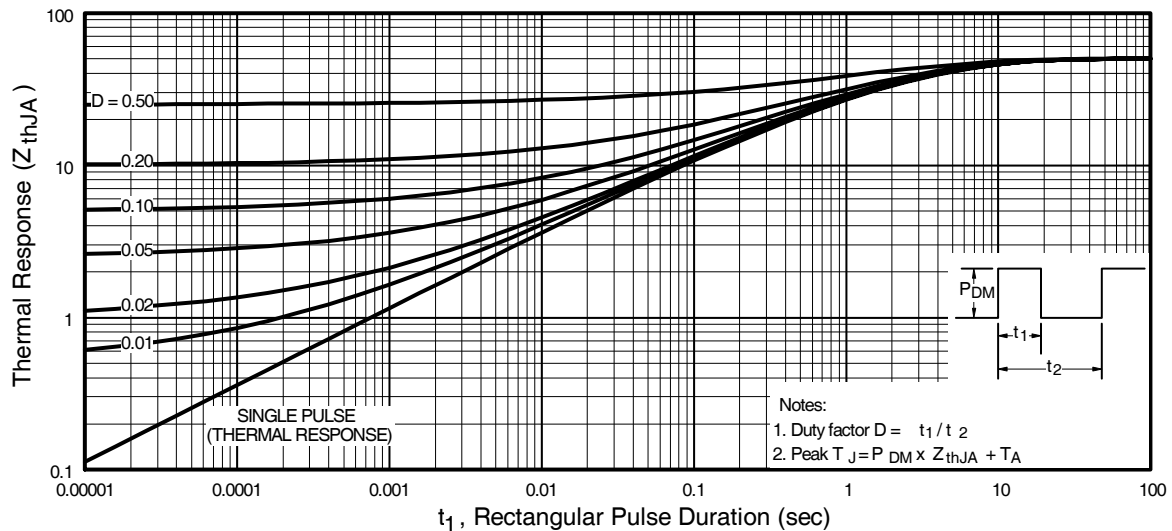
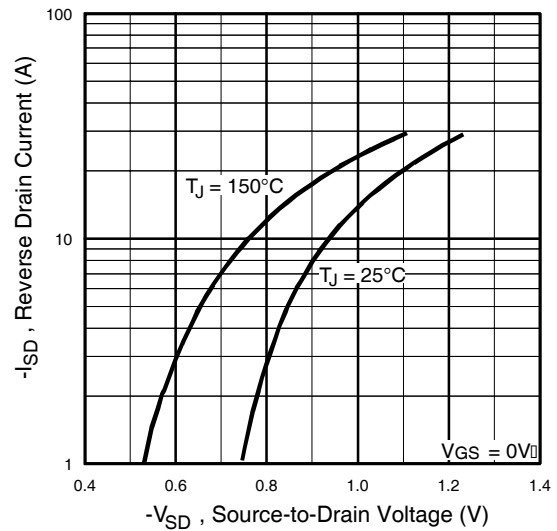
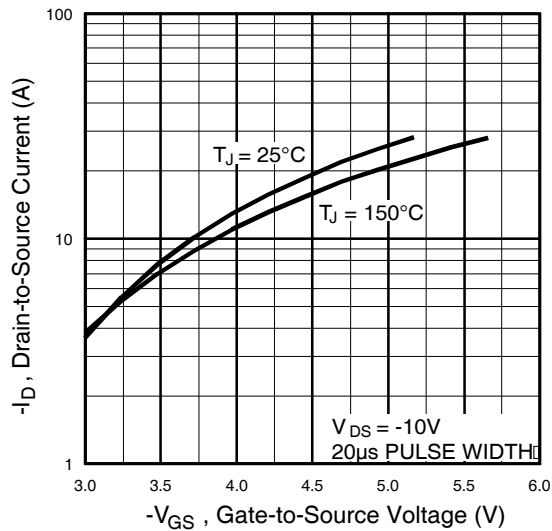
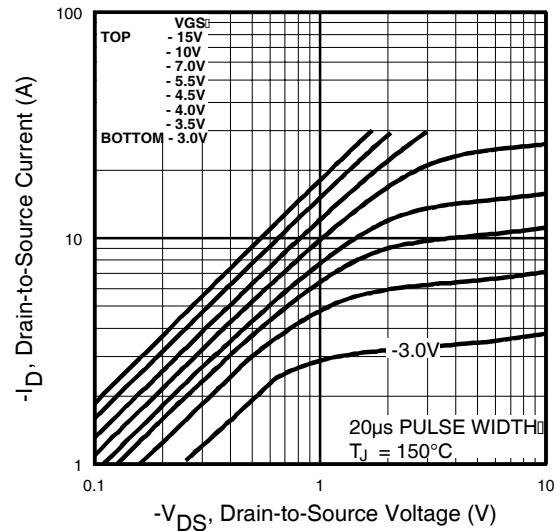
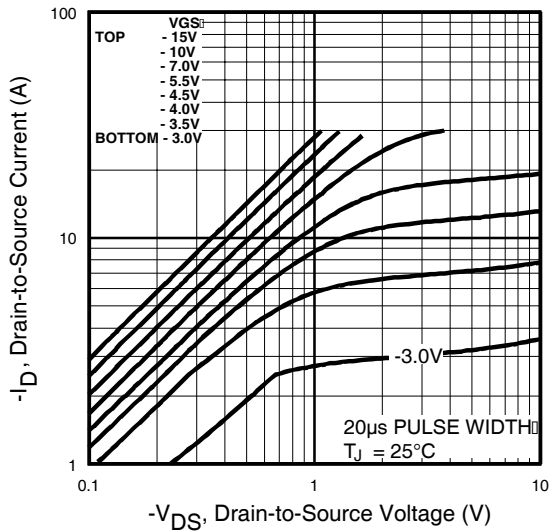


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

P-Channel



P-Channel

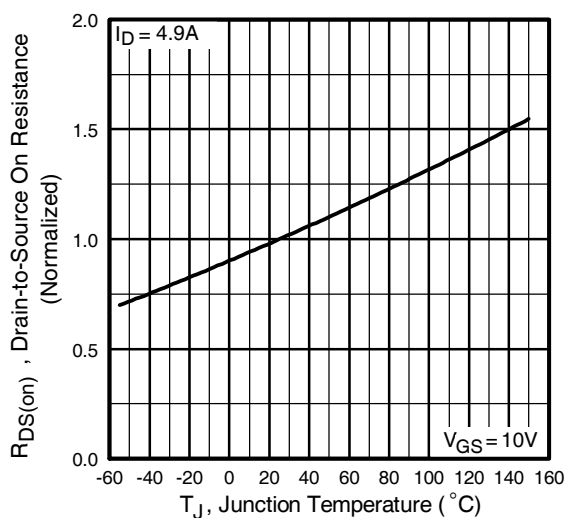


Fig 16. Normalized On-Resistance Vs. Temperature

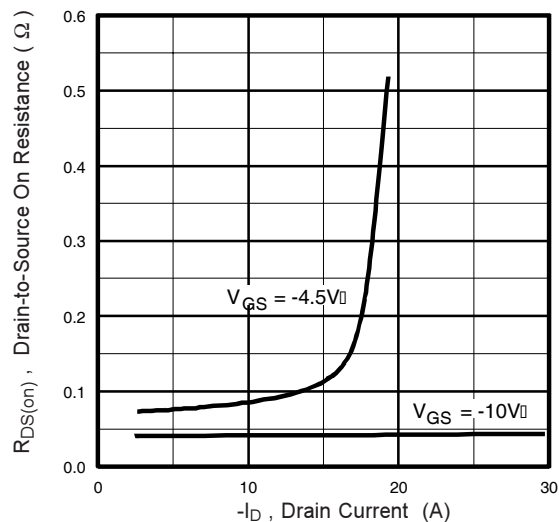


Fig 17. Typical On-Resistance Vs. Drain Current

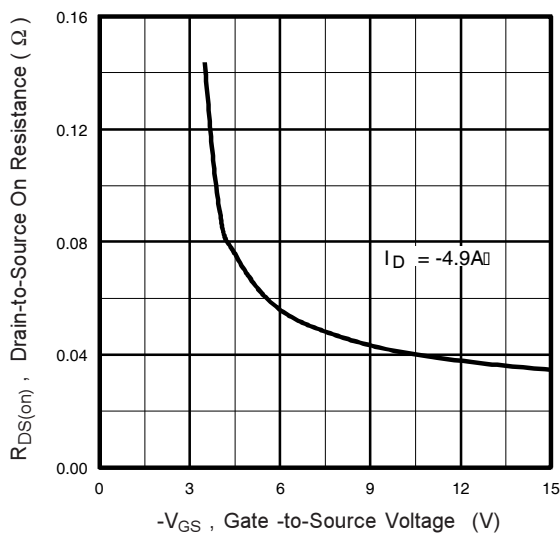


Fig 18. Typical On-Resistance Vs. Gate Voltage

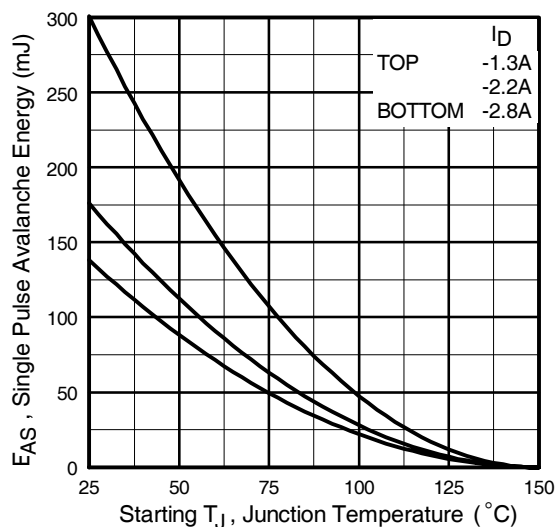


Fig 19. Maximum Avalanche Energy Vs. Drain Current

P-Channel

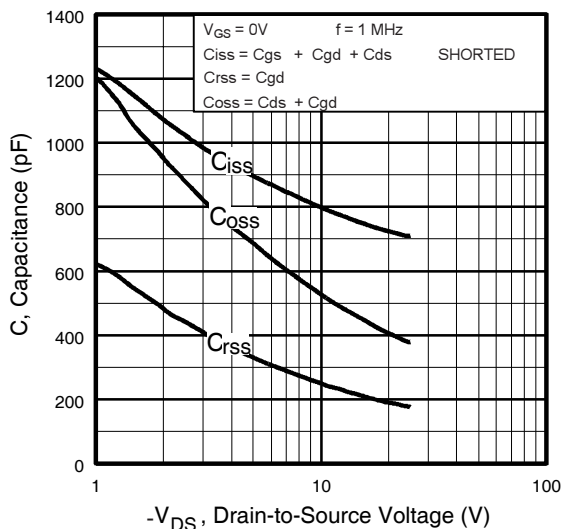


Fig 20. Typical Capacitance Vs. Drain-to-Source Voltage

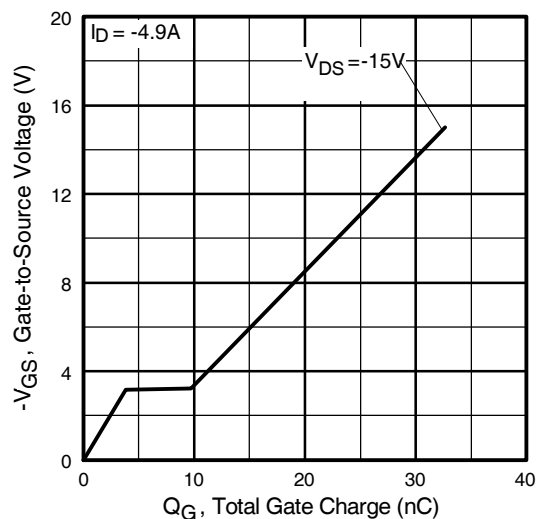


Fig 21. Typical Gate Charge Vs. Gate-to-Source Voltage

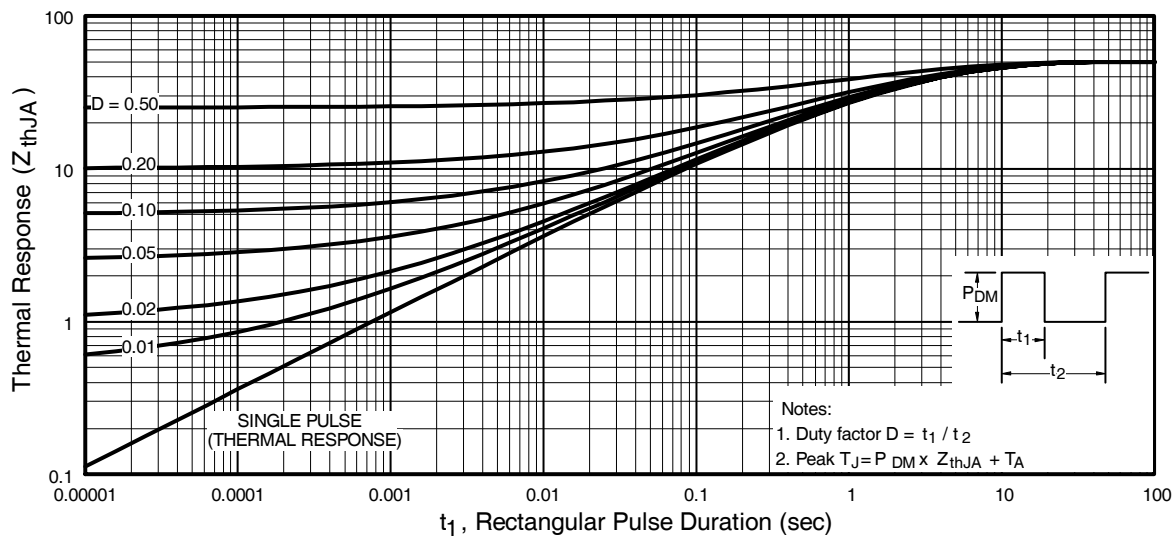
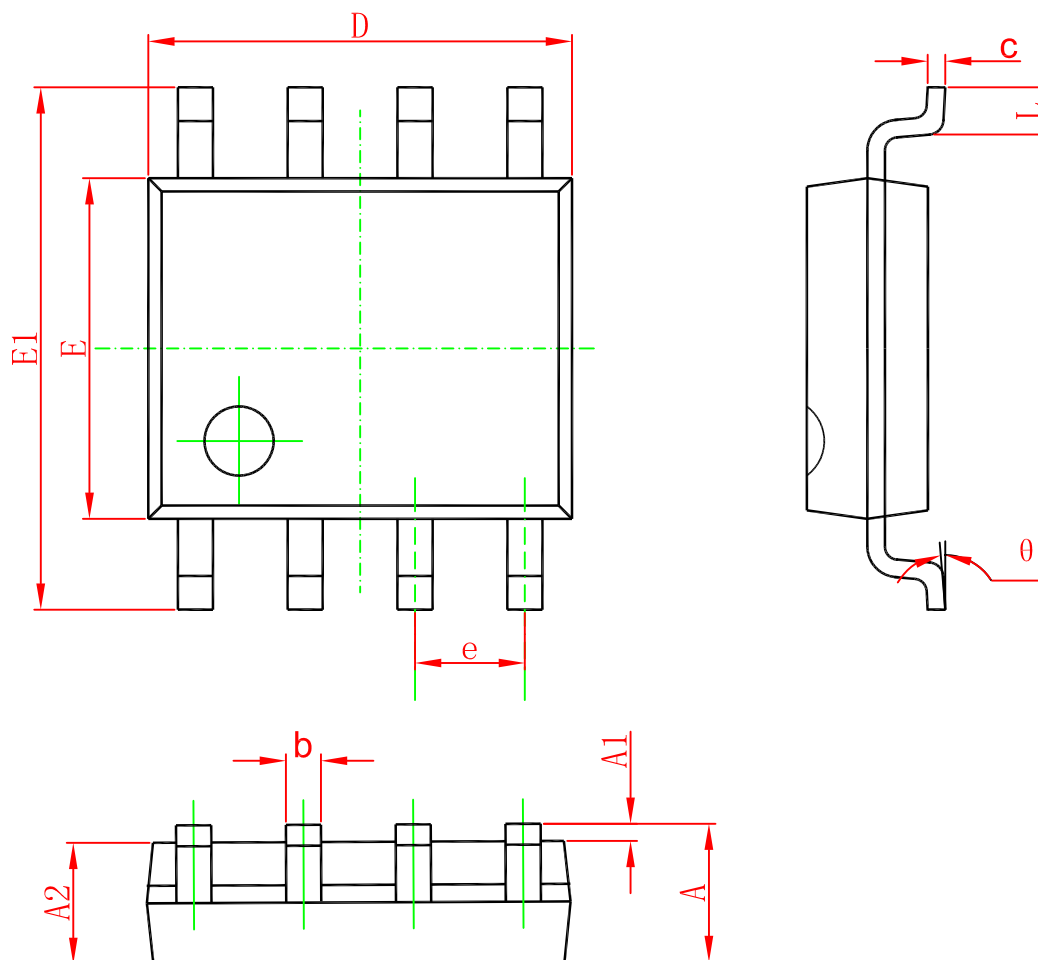


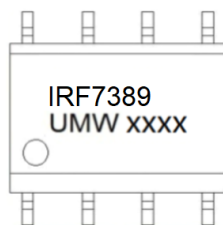
Fig 22. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRF7389TR	SOP-8	3000	Tape and reel